EASTERN UNIVERSITY, SRI LANKA

THIRD EXAMINATION IN SCIENCE-2010/2011 (APRIL/MAY' 2013)

FIRST SEMESTER

CH 303 ELECTROCHEMISTRY

(Proper & Repeat)

Answer all questions **Time Allowed: One hour**

[Faraday constant = 96485 C mol^{-1}, 2.303 RT/F = 0.0591 V]

1) a) i) Define the term 'Temperature coefficient'

(05 marks)

ii) The emf of the cell $Pb(s)/PbCl_2(s)/KCl(aq)/AgCl(s)/Ag(s)$ is given by the expression

$$E = 0.00823\,T + 0.0000174(T^2 - 25)$$

Where T is the temperature in Kelvin. Write the cell reaction and calculate ΔG, ΔH and ΔS for the reaction occurring in the cell at 25 °C

(30 marks)

b) For the cell $Ag(s)/AgBr(s)/KBr(aq, 0.05M)//Cd(NO_3)_2(aq, 0.01M)/Cd(s)$ at 25 °C

i) Determine $log\ \gamma_{\pm}(Cd(NO_3)_2)$, $log\ \gamma_{\pm}(KBr)$ by using Debye-Huckel limiting law

ii) Estimate E_{cell} [assume $\gamma_+(Cd^{2+}) = \gamma_{\pm}(Cd(NO_3)_2)$, $\gamma_-(Br^-) = \gamma_{\pm}(KBr)$]

$[[E^{\theta}_{Cd^{2+},Cd} = -0.40\ V, E^{\theta}_{Ag,AgBr,Br^-} = 0.07\ V]$

(45 marks)

Contd…

c) Briefly explain the conductrimetric titration of weak acid and strong base.

(20 marks)

2) (a) (i) Define the term 'Transport number'

(05 marks)

(ii) For a strong electrolyte $A_{\upsilon_+}B_{\upsilon_-}$ by using the usual notations show that the transport number t_+ is

$$t_+ = \frac{\upsilon_+\Lambda_+}{\upsilon_+\Lambda_+ + \upsilon_-\Lambda_-}$$

(20 marks)

(iii) The limiting molar conductivities at 25 ^{0}C for $La^{3+}(aq)$ and $SO_4^{2-}(aq)$ are 209 and 160 Scm^{2}mol^{-1} respectively. Find the limiting molar conductivity of $La_2(SO_4)_3$ (aq) and transport number of La^{3+} and SO_4^{2-}.

(25 marks)

(b) In a Hittorf experiment a $CdSO_4$ containing 115.60 g of $CdSO_4$ per 1000g of solution was electrolysed between Cd electrodes. A current of 0.1 amp was passed for 5 hours. After electrolysis the mass of the anode solution was found to be 171.66 g and it contained 20.72 g of $CdSO_4$. Calculate

i) the electricity passed through the solution in faraday (F)

ii) the net gain of Cd^{2+} ions in the anodic compartment

iii) the transport number of the Cd^{2+} ions in the solution

[Cd=112.4 g]

(50 marks)

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